

CALFED Bay-Delta Program

Water Quality Program

Stage 1A

Drinking Water Actions

Early Implementation Actions

DESCRIPTION	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
Veale Tract drainage discharge relocation feasibility study and environmental documentation	Several agricultural discharges from Veale Tract considerably increase salinity and organic matter. Environmental documentation for relocation or treatment of the drains is proposed.	South Delta, Veale Tract, and Old River	Reduced levels of total organic carbon (TOC), pathogens, and nutrients in Contra Costa Water District (CCWD) intake at Rock Slough
Feasibility study: Management, relocation, and/or treatment of Reclamation District (RD) 800 drain discharge	Urban and agricultural discharges in the RD 800 area may affect south Delta exports for drinking water. Impacts need to be managed.	South Delta, Discovery Bay, and the proposed Mountain House community	Implementation of watershed best management practices (BMPs) to prevent input of nutrients, pathogens, and TOC
Elimination of discharges of waste from watercraft in the Delta and tributaries	Certain laws currently allow discharges from watercraft, both recreational and commercial. Laws also allow the State to prohibit such discharges.	Bay and Delta	Elimination of nutrient and pathogen loading from watercraft
Barker Slough watershed restoration	The Barker Slough watershed contributes organic material to the North Bay Aqueduct (NBA) that, after treatment, produces DBPs. Watershed restoration is aimed at eliminating a majority of the organic carbon.	Barker Slough watershed	Reduced levels of TOC, pathogens, and nutrients in the NBA intake
Assessment of sources and magnitudes of loadings of constituents of concern for drinking water	A comprehensive, perpetual, and evolving study of loads of specific drinking water constituents of concern that are discharged, either by point sources or nonpoint sources to the Delta.	The entire Delta and tributaries, as necessary for problem definition and resolution	Reduced levels of TOC, pathogen, and nutrients
Evaluation of TOC	Source identification of TOC and pilot testing of treatment methods on agricultural drain water from Delta islands.	Delta island drains and lower river drains	Reduced levels of TOC that reach the intakes at pumping stations
Convene a Delta Drinking Water Council in a public forum to consider relevant technical data and inform the governing entity in its consideration of solutions to identified public health issues for urban users of Delta water (Years 1-7).	In furtherance of CALFED's drinking water quality objective to continuously improve source water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water, the Delta Drinking Water Council (Council) will be formed as a standing subcommittee of BDAC.	The Bay Delta and its tributaries	Continuous improvement of source water quality

Stage 1 Actions

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
1. Prepare project-level environmental documentation and permitting as needed (Years 1-7).	The continuous process of developing and managing the Water Quality Program.	Bay-Delta solution area	
2. Coordinate with other Program elements to ensure that in-Delta modifications maximize the potential for Delta water quality improvements (Years 1-7).	Ongoing coordination and integration.	All areas	
3. Continue to clarify the use of and fine tune water quality performance targets and goals (Years 1-7).	Receive input and incorporate recommendations as results from studies and actions become available.	All areas	
12. Perform other actions specific to drinking water improvements:	Drinking water protection is complex. Much of the proposed actions are associated with source water protection, while some focus on treatment technology and health studies. Protecting drinking water quality likely will require significant success in many of the proposed actions.	Entire water-shed and Bay-Delta	Reduced drinking water contaminants of concern sufficient to meet state and federal drinking water concentrations
• Control TOC contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvement (Years 1-7).	Individual actions throughout the Bay-Delta to reduce TOC to appropriate levels.		
• Study brominated and chlorinated DBP operational controls at water treatment plants and implement incremental improvements as warranted (Years 1-7).	Determine how much operational control can affect DBP production and encourage implementation of optimum operational procedures at individual treatment plant.		
• Control pathogens through control of cattle, urban stormwater, sewage, boat discharge, and possibly recreational swimming; includes various projects depending on the area of impact (Years 3-7).	Pathogens from human and animal sources need to be reduced in source waters. Most control mechanisms are going to be educational and operational in nature. The objective is to reduce pathogens while preserving other beneficial uses such as recreation and agriculture.	Lakes, reservoirs, bays and estuaries within the Bay-Delta	Reduced Pathogens in supply water
• Study impacts on recreational swimming impacts and impacts from wild animals (Year 4).			
• Relocate Barker Slough intake (Years 7 +).	Relocation of the Barker Slough intake would be considered if management practices in the watershed did not prove to be sufficiently effective at removing TOC, nutrients and pathogens.	Barker Slough area	Reduced TOC, Nutrients and pathogens in Barker Slough supply water

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
<i>Action 12 (cont.)</i>			
<ul style="list-style-type: none"> Reduce methyl tert-butyl ether (MTBE) in various areas (Years 3-5). 	The gasoline additive MTBE accumulates in lakes, but is being phased out. No action necessary.		
<ul style="list-style-type: none"> Address water quality problems in terminal reservoirs (Years 3-5). 	Reduce algae, pathogens, and other water quality problems in the terminal reservoirs.	Terminal reservoirs	Meet all drinking water standards
<ul style="list-style-type: none"> Perform public health effects studies, as needed, to more specifically identify the potential health effects of bromide-related DBPs (Years 1-3). 	A detailed analysis of health effects are needed to determine source water conditions required for health needs	Entire Bay-Delta	Numerical Targets in source water
<ul style="list-style-type: none"> Investigate alternative sources and means of providing high-quality water supply for urban users of Delta water (Years 1-7). 	Alternative sources of water may exist for blending purposes to improve drinking water quality and enhance reuse options	Entire Bay-Delta	
<ul style="list-style-type: none"> Investigate, as needed, advanced treatment technologies for the removal of salt, bromide, TOC, and pathogens from urban water supplies (Years 1-7). 	This is the study of specific treatment techniques and the combination of techniques to minimize development of DBPs	Entire Bay-Delta and service areas	
<ul style="list-style-type: none"> Investigate combinations of new supplies and technologies that can minimize salt content of urban water supplies and provide greater public health protection (Years 1-7). 	This is a combination of the two above tasks.	Entire Bay-Delta and service areas	Meet all drinking water standards and enhance reuse of wastewater
<ul style="list-style-type: none"> Develop a plan sufficient to meet forthcoming U.S. Environmental Protection Agency and Department of Health Services standards for brominated DBPs (by Year 7). 			

Year 2000 and 2001 Priority Actions

Veale Tract Drain Relocation - 6

1. General Description of the Action

Study environmental impacts of relocating Veale Tract agricultural drains and contribute to relocation costs.

The goal is to minimize impacts of surrounding agricultural land on the drinking water intake of CCWD and biological resources.

The Rock Slough intake to the Contra Costa Canal is located in the west-central Delta in the vicinity of Knightsen in eastern Contra Costa County. The land surrounding Rock Slough is primarily agricultural. The few residences scattered in the vicinity of the intake are ancillary to agricultural operations. Water levels in Rock Slough are subject to tidal variations, and a typical daily variation is about 3.5 feet. Peaks in Rock Slough salinity are typically caused by seawater intrusion from the San Francisco Bay during periods of low Delta outflow (typically, summer and fall), or by agricultural drainage discharges from the Delta and San Joaquin River during leaching and heavy storms (typically during winters of normal and wet years).

A number of agricultural drainages discharge into Rock Slough and Contra Costa Canal. Veale Tract, an area of approximately 1,100 acres, is the largest single land area draining to Rock Slough. Drainage from Veale Tract has been suspected to be the major cause of salinity increases at the District's intake during wet winters. For example, chloride at Pumping Plant No.1 was over 100 mg/L in February and March of 1996 when the chloride level at the junction of Old River and Rock Slough was under 50 mg/L. Agricultural drainage during wet winters can lead to significant increases in the concentrations of dissolved solids, total organic carbon (TOC) and, possibly, pathogens in CCWD's drinking water supply from Rock Slough and at other urban drinking water intakes in the Delta.

2. Cost Estimates

Mobilization costs, staff costs, and laboratory costs to perform sampling and generate a conclusive summary of existing conditions and feasibility of treatment of relocation to alternative locations will cost approximately \$1.0 million, which is to be expended in FY 2000. Contribution to the approximately \$ 4.0 million relocation project would need to be decided.

CALFED staff would be involved in program development and the results of the study. This should be of limited time, approximately one month of staff time for FY 2000.

3. Program Administration and Governance

The CALFED Water Quality Program should oversee the scope of the project. DWR should

oversee evaluation of existing conditions and alternative impacts. The US Bureau of Reclamation should be the federal contract authority if necessary.

4. Program Coordination

Detailed monitoring is already being carried out by the Department of Water Resources (DWR), the Bureau of Reclamation (Bureau), and CCWD at several locations along Rock Slough and Contra Costa Canal. Sampled parameters include EC, chlorides, metals, pesticides, pathogens, and other constituents as part of the D1485 compliance monitoring and the Municipal Water Quality Investigation Program. However, a lack of simultaneous measurements along the length of the two channels does not allow the source(s) of degradation to be identified conclusively. CCWD would be the CEQA lead agency for preparation of the EIR.

5. Schedule

To pinpoint and quantify the sources of salt and other contaminants into Rock Slough and the Canal, simultaneous measurements along a number of locations (up to twelve) between CCWD Pumping Plant No. 1 and the junction with Old River are planned for the late fall/winter of 1999-2000.

Sampling alternative drain locations will be done at various times throughout the characterization process.

Year 2000 and 2001 Priority Actions

RD 800 Drain - management, relocation and/or treatment

1. General Description of the Action

Drain discharges from Reclamation District 800 (RD 800) consist of commercial, urban stormwater, urban wastewater, and agricultural discharges. Each of these separate sources contributes, to one degree or another, constituents that can impair the beneficial uses of the delta water.

The goal in this proposal is to identify feasible methods by which one could minimize potentially adverse impacts of these discharges through management, relocation of discharges, and/or treatment. Minimization of these constituents in Bay-Delta water reduces the need for additional treatment at drinking water treatment plants. The proximity of the RD 800 drains to the diversion pumps increases the likelihood of constituents from RD 800 of getting to the diversion pumps.

2. Cost Estimates

Approximately \$1.0 million dollars are needed the first year for the study. Treatment and relocation studies/efforts could increase the cost to approximately \$6.0 million in 2001. Cost sharing might be possible through various programs if funds are available.

CALFED staff requirements would amount to one staff person for about a few months per year to analyze data and attend related meetings. Limited supervisory time is necessary for review of staff persons work.

3. Program Administration and Governance

The CALFED Water Quality Program should oversee the coordination of agencies and approval of funds spent. **Contracts for sampling should be let through the Department of Water Resources. An alternate federal contract authority could be the USGS.**

4. Program Coordination

This program involves sampling not currently performed and land use studies. The Department of Water Resources or the Regional Water Board would be able to do the sampling.

5. Schedule

This study could begin as soon as funds are identified.

Year 2000 and 2001 Priority Actions

Barker Slough Watershed Restoration - 25

1. General Description of the Action

Implement a watershed management program within the Barker Slough watershed to eliminate to need to curtail deliveries from the North Bay Aqueduct because of elevated TOC leading to disinfection byproducts. This would lead to better health protection for the population receiving water and a more reliable quantity of water.

Solano County Water Agency and the other NBA contractors requested and received \$580,000 from the SWRCB, Proposition 204 funding for the development of a watershed management program to address the drinking water contaminants in the Barker Slough watershed. These contaminants include TOC, pathogens and nutrients, and cattle control near the Barker Slough intake. A Watershed Stakeholders Group was formed to advise the NBA contractors on all aspects of the watershed management program. The tasks included identifying areas that have the greatest impact on raw water quality and designing best management practices (BMPs) that could potentially improve the quality of runoff water and the quality of water in Barker Slough at the pumping plant.

The most suitable BMPs, including both structural and non-structural, will be evaluated in pilot studies. The effectiveness of the BMPs will be ascertained through water quality monitoring. Several property owners have expressed an interest in working with the NBA contractors to study various methods of improving water quality and several site visits have been conducted. A watershed management plan will be cooperatively developed based on the evaluation of BMPs in the pilot study.

2. Cost Estimates

Some selected implementation for the 2000 can be accomplished for be about \$800,000. Subsequent implementation would cost about the same each year for 5 - 10 years.

CALFED staff involvement would be limited in this program. However, CALFED staff should examine the BMPs developed through this program for possible implementation elsewhere in the Delta and through the State Water Project. Participating in the program combined with compiling these BMPs for more general distribution could take a month or two of staff time.

3. Program Administration and Governance

The CALFED Water Quality Program should oversee the scope of the early implementation. DWR should oversee contracting and funding. The USDA Natural Resource Conservation Service could be the contract administrator in lieu of DWR if necessary.

4. Program Coordination

The Department of Water Resources could coordinate the contracting and funding of different implementation aspects of the BMPs.

5. Schedule

The funding for BMP development has been let and BMPs should be forthcoming. Implementation of the BMPs in large pilot scale and watershed implementation should begin in the spring of 2000. Further implementation will continue over the next 5-10 years, depending on success of the program.

Year 2000 and 2001 Priority Actions

Drinking Water Assessments - 36

1. General Description of the Action

Assess sources and magnitudes of loadings of constituents of concern for drinking water and evaluate potential for correction.

Total Organic Carbon (TOC) is a water quality constituent that is a precursor to disinfection byproducts which are human health hazards. TOC originates from many sources including vegetation in natural channels, algae, decomposing peat soils, agricultural drain material, and treated sewage effluent. These sources and more are present in the Delta. The relative contributions of each source to the TOC levels in export pumps is not well understood.

Nutrients in the delta contribute to algae production which produces more TOC upon degradation.

High salinity in drinking water reduces the utility of the water to be recycled. The origin of the salt in the export pumps is largely attributed to the ocean. Full assessment of the methods salt is introduced and reduction of salinity are warranted.

Pathogens originate from sewage treatment plants, water craft, confined animal facilities, and urban stormwater. Determining relative contributions and implementing programs to reduce pathogen loading are warranted.

Bromide is a salt constituent that commonly originates in ocean waters that intrude on the delta. Sea water is picked up at the diversion pumps in the south delta and delivered to the San Joaquin Valley. Other sources of bromide may also contribute to south delta diversions. Sources of bromide and control options are proposed to be studied.

Both water users and ecosystem would benefit from control of bromide.

2. Cost Estimates

Monitoring studies would begin in some critical areas at a cost of about \$0.5 million for the first year. As different issues are studied in greater depth, the budget should be increased to \$1 million per year for a several years.

CALFED Staff for about 1/2 time would be needed to oversee priorities in studies of different areas. Additional CALFED time may be used if modeling is needed.

3. Program Administration and Governance

The CALFED Water Quality Program should oversee the priorities of individual studies and coordination study efforts. The Water Quality stakeholder group (the Water Quality Technical Group) would be given access to results of the studies and would have input on priority criteria.

Study contracting services should go to DWR or to USGS.

4. Program Coordination

The Department of Water Resources has the research staff to conduct or contract for studies and other pilot scale projects. USGS also has scientists for studies and appropriate contract offices.

The Department of Water Resources staff and it's Bryte Chemical Laboratories could provide staff and services for sampling and analysis.

5. Schedule

Assessment structure should be designed by mid to late 1999 and studies based on priority structure could begin by January 2000.

Year 2000 and 2001 Priority Actions

Total Organic Carbon (TOC) Evaluation and Treatment - 33

1. General Description of the Action

Develop a TOC monitoring system for the Delta and conduct pilot scale treatment system studies to remove TOC from agricultural drains.

The goal to identify costs and operational constraints of treating agricultural drain water to meet future standards imposed on drinking water quality. Between pilot scale testing and area TOC monitoring, we will be able to accurately evaluate the feasibility of this option

Total Organic Carbon (TOC) is a water quality constituent that is a precursor to disinfection byproducts which are human health hazards. TOC originates from many sources including vegetation in natural channels, algae, decomposing peat soils, agricultural drain material, and treated sewage effluent. These sources and more are present in the Delta. The relative contributions of each source to the TOC levels in export pumps is not well understood.

Monitoring of TOC in delta waterways has been done on a limited basis but it needs much more refinement. Monitoring of agricultural drains could provide the information necessary to determine if moving a drain would improve export water quality without adversely impacting other beneficial uses. Automated TOC samplers could be employed at various locations to get frequent data of discharges and surface water. A complete monitoring system is proposed for the 1999/2000 wet season and irrigation season.

Removal of TOC can be accomplished in a few methods, the most common of which are enhanced coagulation and microfiltration. A pilot scale treatment system is proposed for a agricultural drain from a delta island with peat soils. The pilot project would include selection of the treatment system, operation to steady state, monitoring and evaluation.

TOC removal is proposed to benefit the ecosystem and export water quality. One benefit added to the obvious benefit to water quality is the possibility of being able to use the solid treatment residue for enhancing habitat.

2. Cost Estimates

Monitoring studies of TOC in the Delta would begin at some critical locations at a cost of about \$0.5 million for the first year. If the program is successful, the program could be continued at that level or increased to \$2 million per year for a several years and then decreased to about \$0.5 million a year after about year 5.

The pilot scale treatment project will cost about \$4.0 million dollars after design, permitting, equipment costs, energy costs, sampling, and report generation. Subsequent years may have similar costs for further testing or higher costs for full scale implementation. Full scale

implementation costs could be shared by affected parties.

CALFED Staff for about 1/4 time would be needed to oversee design and implementation as well as evaluation of the data. Additional CALFED time may be used if modeling needed to be done to extrapolate monitoring results to other parts of the delta or to different water years.

3. Program Administration and Governance

The CALFED Water Quality Program should oversee the coordination of pilot scale development and siting of the TOC monitoring locations. The Water Quality stakeholder group (the Water Quality Technical Group) would be given access to the monitoring data as well as various interested parties to independently scrutinize the results.

Design and contracting services should remain with DWR. If required, the US Army Corp of Engineers could act as the contracting agency for this work.

4. Program Coordination

The Department of Water Resources has the engineering staff to contract design and oversee delivery and installation of pilot scale test equipment and related monitoring for test verification.

The Department of Water Resources staff and it's Bryte Chemical Laboratories could provide field staff and necessary reagents for automated sampling. Bryte Chemical Labs could also provide testing for various forms of TOC in samples gathered by DWR. This new sampling program could be incorporated into a DWR sampling program if funds were made available.

5. Schedule

Design and operation of the TOC Delta monitoring system and the pilot scale treatment plant can be accomplished prior to the beginning of Fiscal 1999-2000. Implementation of both programs could begin immediately upon funding. Monitoring efforts should be expanded and extended beyond 2000.

Delays in contracting or equipment delays could slow completion. If advance authorization is given, most delays could be eliminated.

Year 2000 and 2001 Priority Actions

Eliminate discharges of waste from water craft in the Delta and Tributaries

1. General Description of the Action

Waste discharges from water craft contribute pathogens, nutrients, and toxic pollutants to the Bay-Delta estuary. Ocean going vessels also discharge in the Bay-delta and may be responsible for introducing foreign species to California's water ways.

The initial step for the recreational boaters would be education. Education of the water craft community could eliminate much of the problem. Secondly, pumpout facilities should be encouraged and endorsed through several agencies. Failure to achieve compliance following these steps would likely lead to restrictions or bans on discharges.

Impacts of bilge water discharges could be reduced through procedural changes (ie: requiring bilge pumpout within 15 miles of departing port and again at least 15 miles of destination port). Future changes may eliminate impacts by requiring pumpout of bilges, thus eliminating engine fluids and the like.

2. Cost Estimates

Initially, these exercises would cost about \$0.5 million per year. Pumpout facilities would increase the costs significantly and may be required at a later date.

CALFED staff would be responsible for coordination of these activities with the local, state and federal agencies.

3. Program Administration and Governance

CALFED water quality program should oversee development of the scope of individual phases of the project and should coordinate efforts with related agencies. Contracts should be let by DWR or the State Water Board. Any future contracts on pumpout facilities should be let through the Department of Boating and Waterways. Federal contracting should be done through the Bureau of Reclamation or the Army Corps of Engineers.

4. Program Coordination

There is currently a task force of local, state and federal agencies that have been discussing the options available. CALFED staff would coordinate with this group and provide some necessary funding.

5. Schedule

Past work by other agencies has brought this project to "ready to implement status".